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ABSTRACT

This study revised the Teacher Beliefs Survey (S. Wooley and A. Wooley, 1999; TBS), an instrument to assess teachers' beliefs related to constructivist and behaviorist theories of learning, and then studied the validity of the revised TBS. Drawing on a literature review, researchers added items for the existing constructs of the TBS and added a new construct, Constructivist Management. Expert feedback was used to revise the TBS. The revised TBS was then administered to 371 college freshmen and 290 student teachers. Confirmatory factor analysis was performed to examine the construct validity of the revised survey. Although the hypothesized model was not confirmed, the additional items and construct did provide information to assess teachers' beliefs more adequately in relation to the prominent learning theories of constructivism and behaviorism. There were differences in the responses of freshmen and student teachers, a finding that suggests the TBS can be used with caution to assess changes in teachers' beliefs as they progress through programs. An appendix contains the TBS and shows the proposed constructs. (Contains 4 tables and 14 references.) (SLD)

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Revision and Validation of the Revised Teacher Beliefs Survey

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Revision and Validation of the Revised Teacher Beliefs Survey

A. Purpose of the Research

The purpose of this study is to revise the Teacher Beliefs Survey (TBS), an instrument to assess teachers' beliefs related to constructivist and behaviorist theories of learning, and then to validate the revised TBS. A pilot study using the original 34-item TBS retained 27 items that loaded on four hypothetical constructs, named: Behaviorist Management (BM), Behaviorist Teaching (BT), Constructivist Teaching (CT), and Constructivist Parents (CP) (Woolley & Woolley, 1999). A validation study of the 27-item TBS with a larger sample retained 21 items and eliminated the CP factor (Woolley, Benjamin, & Woolley, 2001). The latter study suggested additional work, including development of a larger pool of items for the existing factors and development of an additional factor to assess teachers' beliefs related to constructivist approaches to management. We grounded the TBS in real world practice by beginning the development process by interviewing regional teachers. Clearly missing are items related to a constructivist approach to supporting children's socio-moral and affective development (DeVries & Zan, 1994; Kohn, 1996). It may be that many of the teachers we interviewed are using a more behaviorist approach to management, even while they implement curricula with teaching and assessment strategies based on constructivist learning theory.

B. Theoretical Framework

Increasingly, improvement efforts in P-12 schools and teacher education programs are based on constructivist theories of learning (Danielson, 1996; Fosnot, 1996, Richardson, 1997). Discussions of constructivism dominate professional conferences and journals. Constructivist approaches are also reflected in P-12 standards set by many professional organizations, including the National Council for Teachers of Mathematics, the National Science Teachers Association, and the National Council of Teachers of English with the International Reading Association (Fosnot, 1996). Constructivism is not new, but it has been overshadowed by behaviorism (sometimes referred to as "traditional" because of the dominant influence of behaviorist learning theories on American schools in much of the 20th century).

Many teacher educators are incorporating teaching methods based on constructivist theories of learning in their courses and programs (Guyton & Rainer, 1996; Richardson, 1997). Since it is well established that teachers generally teach as they were taught (Lortie, 1975), teacher educators can assume that many of their students enter their teacher education courses with beliefs based on behaviorist learning theories. It is also recognized that it is difficult to change teachers' beliefs (Richardson, 1996). Therefore, many teacher educators believe that it is important for them to use constructivist approaches in their own teaching. This allows preservice and inservice teachers to experience constructivist approaches from a learner's perspective, and then to have opportunities to reconstruct their beliefs based on their reactions as students.

At the same time that many teacher educators are experimenting with constructivist approaches, there is an increasing demand that they raise standards and be accountable for the quality of their graduates (e.g., Goodlad, 1990 & 1994). Many states are implementing tougher requirements for entry into and exit from teacher education programs. Clearly, teacher educators

need to develop comprehensive evaluation programs to demonstrate that their graduates have the knowledge, skills, and dispositions necessary to impact the learning of P-12 students. Since a connection has been established between teachers' beliefs and practices (Richardson, 1996), we assume that a valid and reliable measure of teachers' beliefs will be useful to teacher educators as one component of a comprehensive evaluation program.

C. Method

Revision of the TBS:

We reviewed literature describing courses and programs based on both constructivist and behaviorist (traditional) theories of learning and teaching. Based on this literature review, we created additional items for the existing constructs (BM, BT, & CT) and for a new construct; Constructivist Management (CM). The study of face validity of the revised TBS was conducted by asking a group of experts to rate each item to determine whether each statement assesses the hypothetical construct that we propose to measure. The "experts" were also invited to rewrite any of the statements or suggest additional statements. Based on the expert's feedback, we revised the TBS items. The revised TBS contains 48 items including the BM, BT, CT and CM constructs (See Appendix A.)

Validation of the Revised TBS:

The revised TBS questionnaire was given to freshman, and student teachers in Spring 2002, fall 2002 and Spring 2003. A total of 371 freshmen and 290 student teachers participated in this study. Confirmatory Factor Analysis was performed to examine the construct validity of the revised survey. Internal Consistency Reliability (coefficient alpha) was tested to examine the inter-correlations among the items within each construct.

D. Results

Since we had some knowledge of the underlying latent variable structure of the questionnaire, a confirmatory factor analysis was performed to test this hypothesized structure statistically. In the confirmatory factor analysis, the extent to which the data produced by the measure fit a hypothesized model, and the extent to which the model can reproduce the observed data items are estimated iteratively through a variety of available estimation methods (e.g. Maximum Likelihood). Several fit indices are used to measure how well data fit a hypothesized model. X^2 is the Likelihood Ratio Test statistic that has been the traditional measure used to test the closeness of fit between the unrestricted sample covariance matrix S, and the restricted covariance matrix $\Sigma(\theta)$. In general, Ho: $\Sigma = \Sigma(\theta)$ is equivalent to the hypothesis that $\Sigma - \Sigma(\theta) = 0.0$; the X^2 test, then, simultaneously tests the extent to which all residuals in $\Sigma - \Sigma(\theta)$ are zero (Bollen, 1989). The test of our Ho, that TBS is a four factor structure, yielded an X^2 ($df = 854$) value of 4407.2 ($p = 0.0$), RMSEA = 0.087 ($p < .05$), thereby suggesting that the hypothesized model is not entirely adequate.

However, both the sensitivity of the Likelihood Ratio Test to sample size and its basis on the central X^2 distribution, which assumes that the model fits perfectly in the population (i.e., that Ho is tenable) have lead to problems of fit that are now widely known (Byrne, 1998). Thus, given this problematic aspect of the Likelihood Ratio Test, and the fact that postulated models

can only fit real world data approximately and never exactly, other fit indices were used to examine model fit (Byrne, 1998).

In the past Bentler and Bonett's Normed Fit Index (NFI) has been the practical criterion of choice of fit index (Bentler, 1992). However, NFI has shown a tendency to underestimate fit in small samples. Bentler (1990) revised the NFI to take sample size into account and proposed the Comparative Fit Index (CFI). Values for both the NFI and CFI range from zero to 1.00 and are derived from the comparison of a hypothesized model with the independence model. As such, each provides a measure of complete covariation in the data, a value >.95 or .96 indicating an acceptable fit to the data (Hu and Bentler, 1999). The Non-Normed Fit Index (NNFI) takes the complexity of the model into account in the comparison of the hypothesized model with the independence model. However, because the NNFI is not normed, its value can extend beyond the range of zero to 1.00 and, thus, is difficult to interpret. Bentler (1990) suggested that the CFI should be the index of choice. Thompson and Daniel (1996) also suggested that comparative fit indexes and adjusted goodness-of-fit indexes be preferred over normed fit indexes and unadjusted goodness-of fit indexes because they consider sample size. The results of our study indicate that all of the four indices were lower than .90 (NFI = 0.56, NNFI = 0.59, CFI = 0.61, AGFI = 0.71). Therefore, the hypothesis that the data fit the four-factor model was not confirmed.

Further Study of Exploratory and Confirmatory Factor Analysis

The sample used in this study to establish the structure of the TBS included both freshmen and the pre-service teacher enrolled in elementary, secondary, and K-12 special education programs. Perhaps the structure coefficient of each item on each factor was different for the freshman and pre-service teachers, therefore affecting the structure of the TBS. The confirmatory factor analysis was performed separately to examine the underlining structure for freshmen data and the pre-service teacher data. Neither analysis confirmed the hypothesized structure.

To further explore possible different structures of the TBS, an exploratory factor analysis was performed within the freshman and pre-service teacher subgroups. The principal axis method using oblique rotation was used to generate the factor structure. When we examined the possible number of factors, there were 10 factors that had eigenvalues greater than one for both data. However, since the 5th to the tenth factors added little variances, we decided that 4 factors yielded a more parsimonious solution and four factors were retained for further analysis in both data. We carefully examine the loadings of each item on the factor. The items, which clustered together to measure a particular construct, were different between the freshmen data and the pre-service teachers' data. Table I showed the items loaded on each factor for the freshmen and pre-service teachers.

After carefully examining the item structure for each data set, we decided to select the items which cluster together in both data. Twenty eight items were maintained and 4 constructs were named (see Table II). The confirmatory factor analysis based on the remaining 28 items was performed using the total data (n = 661) to confirm the suggested structure. However, the model was not confirmed. (GFI=0.76, AGFI=0.72, NFI=0.56, NNFI=0.56, CFI=0.60). Since the indices indicate no better fit than the originally hypothesized model, we decided to maintain the

whole 48 items in the data for the analysis of internal consistency reliability of each construct (see Table III).

Further Study of Exploratory and Confirmatory Factor Analysis for freshmen data

The original intention for the development of the questionnaire was to examine whether or not the teacher preparation program made the students' beliefs change. We focus on the freshmen data to see what the best model would be for this questionnaire. We randomly split the freshmen data into two halves. We used the first half to run exploratory factor analysis and obtained the suggested factor and model. Then we run the confirmatory factor analysis using the second half of the freshmen data. Unfortunately, the model was not confirmed. (NFI=0.41, NNFI=0.46, CFI=0.51 AGFI=0.71, CN=80.80, X^2= 1812.45, df=435). Since the confirmatory factor analysis did not confirm the suggested model, the exploratory factor analysis was performed using the second half freshmen data and the items were compared with the first half freshmen data. We found that some questions were clustered together within the same construct in both data sets. A total of 30 items were remained for further Analysis. Table IV showed the items within each construct and their internal consistency reliabilities.

D. Discussion

The revised TBS contained more items and an additional construct (CM) than the original questionnaire. Although the hypothesized model was not confirmed, the additional items and construct did provide information to more adequately assess teachers' beliefs related to two prominent learning theories influencing teaching practices in American schools. It seemed that the interpretation of the items between freshmen and pre-service teachers was different. The questions which were supposed to measure a certain construct may be perceived in different way. When students just entered the teacher preparation program, they perceived the questions different from the students who had completed the course work. Perhaps the questions should be phrased differently with a similar teaching philosophy intact. It may also be possible that some questions were interpreted either as constructive teaching or as constructive management. These questions should be either revised or eliminated. However, the 30 questions which we maintained for the freshmen data showed overall internal consistency reliability greater than .7 for CT and BT. And the 48 items original questionnaire has internal consistency reliability greater than .8 for CT and greater than .7 for CM. This information may be useful for further research in instrument development.

The BM scale showed low internal consistency reliability. Perhaps further research should focus on the item development in this area. Throughout this study, we have found that beliefs in the behaviorist approach and in the constructivist approach are not mutually exclusive. One might believe in the behaviorist approach in terms of class management, but use constructivist approach in their teaching. Teaching and classroom management are somewhat related to each other. To make distinct statements to measure the four proposed construct is thus difficult. Further study for the development of the instrument may include multiple versions of this instrument to fit different populations.

E. Conclusion

Although not confirmed with the hypothesized model, the revised TBS provided useful information to teacher educators who are experimenting with constructivist approaches to teacher education as one component of a comprehensive program to evaluate the impact of their teacher education courses and programs. With caution the TBS can be used to assess changes in teachers' beliefs as they progress through programs and after they graduate to determine if observed changes are temporary or permanent. The TBS can also be used by teacher educators and professional developers to make teachers more aware of the theoretical bases of their beliefs about teaching and learning.

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Appendix A Teacher Beliefs Survey and Proposed Constructs

DIRECTIONS: Throughout your teacher education program, you'll be encouraged to think about your beliefs about teaching and how you plan to teach. As you respond to this Teacher Beliefs Survey, write a number on the line beside each statement to indicate how much you disagree or agree with the statement. There are no right answers so respond thoughtfully but quickly.

1	2	3	4	5	6
Disagree Strongly					Agree Strongly

STATEMENTS:

1. It is important that I establish classroom control before I become too friendly with students.	1. BT (q01*)
2. I believe that expanding on students' ideas is an effective way to build my curriculum.	2. CT (q02)
3. I prefer to cluster students' desks or use tables so they can work together.	3. BM (q03)
4. I invite students to create many of my bulletin boards.	4. CT (q04)
5. I like to make curriculum choices for students because they can't know what they need to learn.	5. BM (q05)
6. I base student grades primarily on homework, quizzes, and tests.	6. BT (q06)
7. An essential part of my teacher role is supporting a student's family when problems are interfering with a student's learning.	7. CT (q07)

8. I operate a democratic classroom because I believe it promotes social learning.	8. CM (new) (q36)
9. To be sure that I teach students all necessary content and skills, I follow a textbook or workbook.	9. BT (q08)
10. I teach subjects separately, although I am aware of the overlap of content and skills.	10. CT (q09)
11. I encourage students to propose and negotiate new classroom rules if they feel the current rules are not working.	11. CM (new) (q37)
12. I involve students in evaluating their own work and setting their own goals.	12. CT (q10)
13. I wait for students to approach me before offering extra help.	13. BM (q11)
14. When there is a dispute between students in my classroom, I try to intervene immediately to resolve the problem.	14. BM (q12)
15. I believe students learn best when there is a fixed schedule.	15. BT (q13)
16. I adjust my lesson plan based on results of homework assignments.	16. CT(q14)
17. I make it a priority in my classroom to give students time to work together when I am not directing them.	17. CT (q15)
18. I encourage students to solve internal problems independently when doing group work.	18. CM (q16)

19. I would describe my students as co-managers of classroom procedures and events.	19. CM (new) (q38)
20. I make it easy for parents to contact me at school or home.	20. CT (q17)
21. I encourage students to discuss conflicts in group meetings.	21. CT (q18)
22. Cross-curricular activities are important to a student's development (e.g., writing in social studies, reading in math).	22. CM (q19)
23. I immediately tell students the correct answers when they cannot figure them out by themselves.	23. BM (q20)
24. For assessment purposes, I am interested in what students can do independently.	24. CM (q21)
25. I encourage students to resolve conflicts independently.	25. CM (q22)
26. I invite parents to volunteer in or visit my classroom almost any time.	26. CT(q23)
27. I guide students in finding their own answers to academic problems.	27. CT (q24)
28. I generally use the teacher's guide to lead class discussions of a story or text.	28. BT (q25)
29. I prefer to assess students informally through observations and conferences.	29. BT (q26)

30. I function in my classroom as a learner and partner in learning with my students.	30. CM (new) (q39)
31 I find that textbooks and other published materials are the best sources for creating my curriculum.	31. BT (q27)
32. I encourage parents to follow up on classroom activities with students at home.	32. CT (q28)
33. I believe in developing my classroom as a community of learners.	33. CT (q29)
34. I encourage students to suggest ideas for arranging our classroom.	34. CT (q30)
35. It is more important for students to learn to obey rules than to make their own decisions.	35. BM (q31)
36. When rules don't work, I change the rules based on my professional judgment.	36. BM (q32)
37. I often create thematic units based on the students' interests and ideas.	37. CT (q33)
38. Rewarding students for being good citizens is a good way to teach students to care about one another.	38. BM (new) (q40)
39. I encourage discussions of different opinions and reasons.	39. CT (q34)
40. I believe it is important to involve students in revising classroom rules as needed.	40. CT (q35)

41. I believe students learn most effectively when learning tasks are broken down into small sequential steps.	41. BT (new) (q41)
42. When children request my assistance, I turn the decision-making responsibility back to the child.	42. CM (new) (q42)
43. It is important for teachers to reward students for following classroom rules.	43. BM (new) (q43)
44. It is more effective to provide students with the information they need to know, rather than encouraging them to experiment.	44. BT (new) (q44)
45. I view conflicts between students as opportunities to foster their social and moral development.	45. CM (new) (q45)
46. It is very important that teachers enforce classroom rules once they are established.	46. BM (new) (q46)
47. I believe that encouraging competition among students motivates them to learn more.	47. BT (new) (q47)
48. I encourage students to monitor their own behaviors rather than comply with my authority.	48. CM (new) (q48)

*q01 is variable name for item one. All of the analysis was based on the variable names.

Table I: Items loading on Factors for Freshmen data and Pre-Service Teachers' Data

	Freshmen Data	Pre-Service Teacher's Data
Factor 1	Q02, q03, q04, q07, q36, q37, q10, q15, q38, q18, q23, q26, q39, q28, q29, q30, q33,q34, q35, q41, q43	Q02, q03, q04, q38, q17, q18, q23, q26, q30, q33,q40, q35, q43
Factor 2	Q05, q06, q08, q09, q12, q13, q25, q27, q31, q32, q47	Q05, q06, q08, q09, q11, q13, q20, q25, q27, q31, q44, q47
Factor 3	Q01, q14, q17, q19, q21, q24, q46, q40	Q01, q37, q10, q14, q15, q16, q19, q21, q22, q24, q28, q29, q32, q34, q41, q46
Factor 4	Q11,q16, q20, q22, q42, q45, q48	Q07, q36, q12, q42, q45, q48, q39

Table II: Twenty Eight Items and Four Constructs Based on the Exploratory Factor Analysis from both Freshmen and Pre-service Data

CT (Constructivist Teaching)	Q02, q03, q04, q38, q18, q23, q26, q30 q33, q35
BT (Behavioral Teaching)	Q05, q06, q08, q09, q13, q25, q27, q31, q47
CM (Constructivist Management)	Q01, q14, q19, q21, 24, q46
BM (Behavioral Management)	Q42, q45, q48

Table III: Internal Consistency Reliability of each construct of the original Teacher Beliefs Survey

CT (Constructivist Teaching)	N=17, r=.8150
BT (Behavioral Teaching)	N=10, r=.6811
CM (Constructivist Management)	N=11, r=.7285
BM (Behavioral Management)	N=10, r=.4809

Table IV: Thirty Items and Four Constructs Based on the Exploratory Factor Analysis from Freshmen Data and the Internal Consistency Reliability of each construct

CT (Constructivist Teaching)	Q02, q03, q36, q15, q38, q18, q23, q26,	R=.7170
BT (Behavioral Teaching)	Q05, q06, q08, q09, q12, q13, q25, q27, q31, q32, q47	R=.7416
CM (Constructivist Management)	Q14, q17, q19, q21, q24, q46,	R=.6701
BM (Behavioral Management)	Q16, q20, q22, q45, q48	R=.5411

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